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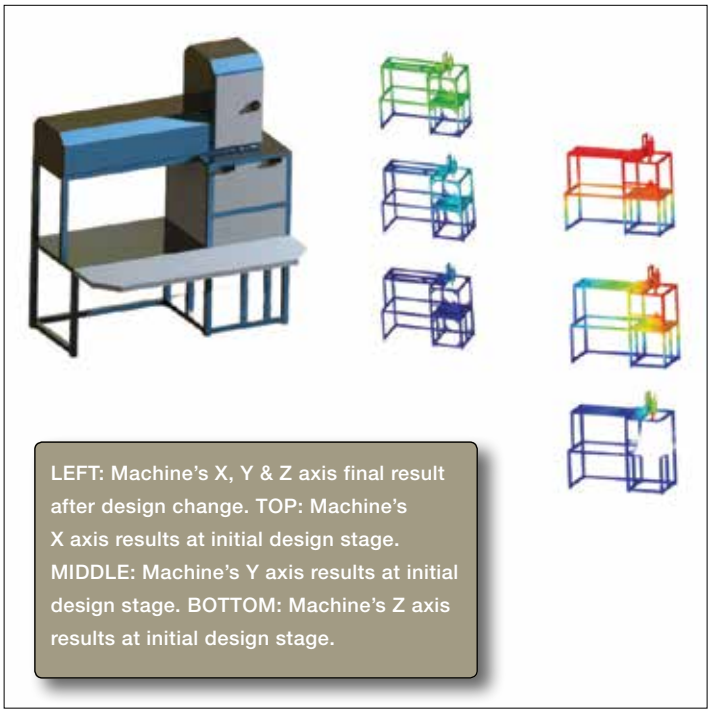
Robust CNC machine design solutions

Computer Numerical Control or CNC machines bring accuracy and zero-defect precision to machine performance. They make production processes faster and efficient, enhance employee safety, lower energy consumption and production costs. With advance designing solutions, these machines are setting new standards for manufacturers. This case highlights how Altair, with its simulation system, helped Jyoti CNC Automation to improve its machine performance.

Jyoti CNC Automation is a reputed name in computerised numerical control metal cutting machines. The company designs and manufactures a wide array of CNC machines for metal cutting industries. It is well-equipped to meet the unique requirements of customers from a range of industrial sectors, including aerospace, automobile, agriculture, die & mould, railways, infrastructure, medical, oil & gas, power, jewellery, and telecommunications, to name a few. With its state-of-the-art research and application facilities equipped with advanced technology, the company is able to meet evolving customer expectations and deliver products of world-class quality.

The challenge

The company relies heavily on innovation and continually develops new products to meet the ever-changing unique requirements from various industry sectors in manufacturing metal cutting components. These new, optimised products need to be developed within a stringent timeframe while ensuring machine accuracy in microns. For one such project, Jyoti CNC was working on the task of optimising the current design and improve the static stiffness of its machines. Given the complexity of the project, the company decided to use simulation technology to ensure



LEFT: Machine's X, Y & Z axis final result after design change. TOP: Machine's X axis results at initial design stage. MIDDLE: Machine's Y axis results at initial design stage. BOTTOM: Machine's Z axis results at initial design stage.

smooth and fast product development, while reducing the cost and resources involved.

The solution

In one of the machine tools exhibitions, Jyoti CNC Automation was introduced to Altair's solutions. Post comparing the products to other solutions in the market, the company decided to go ahead with Altair® HyperWorks® for finite element analysis (FEA) to improve static stiffness of its machines. Since stiffness is dependent on mounting conditions and operating conditions such as load and speed, the company used simulation capabilities of Altair simulation tools to reach the optimised design and arrangement.

Using advanced creation and editing tools, the company was able to obtain the optimised design in a faster and efficient manner. Altair® OptiStruct® solver was then used to validate the effectiveness of the optimised product design. Using data analytics and true-to-life visualisation and rendering capabilities of Altair solutions, Jyoti CNC Automation could perform analysis of various iterations and compare and review the results for different parameters. The company benefitted significantly with the ability to eliminate the errors at the design stage itself.

The results

"Simulation has played a critical role in our product development process. FEA analysis and product design optimisation solutions from Altair helped us obtain the desired mechanical accuracies. We were able to increase the static stiffness in our machine's X and Y axis by 73% and 64%, respectively. We are now using Altair solutions extensively in our research and development activities and will continue to evolve and expand use of these solutions for our upcoming product lines as well," stated Vijay Zala, General Manager (Research and Development), Jyoti CNC Automation. □

Courtesy: Altair – Jyoti CNC